**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
| | ) | |
| Expanding Flexible Use of the 3.7 to 4.2 GHz Band | ) | GN Docket No. 18-122 |
| | ) | |
| Expanding Flexible Use in Mid-Band Spectrum | ) | GN Docket No. 17-183 |
| Between 3.7 and 24 GHz | ) | (Inquiry Terminated as to |
| | ) | 3.7-4.2 GHz) |

# COMMENTS OF SHERROD MUNDAY

December 11, 2018

## I. Background

As part of the United States' efforts to find and allocate spectrum for the purpose of enabling the next-generation "5G" communications, the FCC opened the above-referenced dockets to solicit public comments on the proposal to reallocate some or all of the existing C-band downlink spectrum from 3.7 to 4.2 GHz.

The basis for many comments during the window and also during the preceding NOI were predicated upon the notions that the C-band spectrum was "underutilized" and that there were few users of C-band anymore. Indeed, one study often cited as the basis for promoting those ideas was done by Google in 2014. In that study, Google performed a comprehensive study of the entire IBFS database, looking at imagery for each site registered to determine whether a satellite dish was visible in existing imagery. The conclusion they arrived at was that 29% of the 4,724 sites that were currently authorized were actually not visible in the most current imagery, suggesting that the sites were no longer in use.

Based in part upon this statistic, the FCC implemented a freeze on all new C-band downlink sites and opened a filing window during which respondents could register their usage of C-band that was in effect as of April 19, 2018. After two extensions, the filing window for new site registrations was closed on October 31, 2018. Although the FCC now has nearly 10,000 new sites that were registered during the filing window, the prior conclusion that many sites were not valid had not been re-evaluated since 2014, and no study had been undertaken on the new sites to evaluate their accuracy.

In another study presented in March 2018, Google evaluated one particular test site in the San Francisco Bay area to determine that of the 37 currently authorized sites that were in the

proposed footprint of a fixed wireless transmitter that served customers in the area, only two would be substantially affected, with 57% of the nearby sites no longer in service.

Determining the level of accuracy of the new registrations is an essential part of the debate, because many proponents of 5G are proposing that the C-band spectrum can be shared between current satellite users and new point-to-multipoint services by judicious usage of beamforming, natural and man-made shielding, and frequency filtering.

As a final Capstone project for a Master of Science in Engineering Management, this author undertook a study of the FCC's IBFS database with all the new registrations and any pre-freeze registrations that were still currently authorized. The purpose of this study was to qualitatively and quantitatively analyze the sites registered in the IBFS to determine what level of accuracy may be expected from the old (pre-freeze) and new (post-freeze filing window) registrations.

The data for this study comes from the IBFS itself, taken from a nightly snapshot downloaded on November 6, 2018 after the freeze's filing window had closed.

## II. Methodology

Once all sites were loaded into a database, a query was run to eliminate the duplicate latitude/longitude coordinates that were registered. (In some cases, registrants filed new applications without amending prior active authorizations for the same dish.) Of the 3,798 pre-freeze sites still authorized, a total of 3,606 unique coordinates remained. Of the 10,788 post-freeze sites, there were only 9,878 unique coordinates, for a total of 13,484 unique locations.

From each of those groups, a sample set was taken to achieve a 95% confidence level with a 5% margin of error. The post-freeze group was further segregated between one large entity responsible for 3,161 unique sites (the Latter-Day Saints church) and all other 6,717 post-freeze registrants.

For each of the samples in those four sets, current and historical imagery was consulted on Google Earth, Bing, and other resources as available. A total of nearly 1,500 sites was analyzed; each sample set contained around 350-375 unique coordinates.

## III. Conclusions and Results

The results show that the older pre-freeze location subset has a high rate (30%) of missing antennas, disproportionately influenced by a single registrant (the Associated Press) responsible for 17% of all locations in the subset wherein 82% of the registrant's sites are missing; the remaining 70% of locations were located within 88 m of the actual antenna. Only 16% of this set accurately located their antenna. The 30% value of missing antennas closely matches Google's 2014 study results that showed 29% of all dishes were missing.

By comparison, the Latter-Day Saints church registered 95% of their 3,161 locations within 44 m of their dishes but only 1% of their dishes were accurately located. The remaining subset of 6,717 new post-freeze sites accurately located their dishes 53% of the time and another 39% were within 100 m of the dish, meaning that a total of 92% of this group was found within a median distance of 100 m. While 3% of all new sites did not contain a visible dish, none of the newer dishes were missing after being found in historical imagery (compared with 21% of the legacy sites that included the Associated Press sites).

Overall, the newer data are relatively accurate enough for the FCC to easily verify the satellite dish in imagery a large percentage of the time, but the older data needs to be validated and scrubbed of invalid locations to be meaningful. The newer registrations also suggest further improvements could be made to gather better, more accurate data going forward.

Attached to this submission is the study as presented to the University of Tennessee at Chattanooga on November 30, 2018. Contained therein are the methodology, analysis, results, conclusions and recommendations for the FCC to consider moving forward, along with all references and citations used in the study and referenced again herein.

A careful consideration of the validity of the data in the IBFS is therefore urged prior to making policy decisions based upon data that has known bad information still included.

Respectfully submitted for your consideration,

/s/ *Sherrod Munday*

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